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how-to

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installing SuSE Linux on ProLiant servers

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introduction

ProLiant servers provide an excellent platform for Linux. ProLiant servers are engineered from the ground up to provide performance, reliability, and scalability using industry-standard components. This guide provides additional details for the installation of SuSE Linux on ProLiant servers.

installation overview

The following are the general steps you will perform to install any Linux distribution on your ProLiant server:

1. Run SmartStart to erase the system using the System Erase Utility.
2. Use the SmartStart setup or the ROM Based Setup Utility (RBSU) to configure the server. Ensure the drives on the array are configured, if applicable.
3. After configuring the hardware, insert the operating system CD-ROM and boot to the SuSE installation CD.
4. Select the type of installation.
5. Partition the hard drive. [See the "disk partitioning" section](#) for additional information.
6. Select the installation packages.
7. Set up the network.
8. Install LILO.

Note: LILO is the most used Linux Loader; it uses BIOS calls to load the Linux kernel off the disk (IDE drive or floppy disk). The Linux kernel must be located where it can be accessed easily by the BIOS. You can specify the master boot record (/dev/hda) or the root partition of your Linux installation (which usually is /dev/hda1 or /dev/hda2).

9. Verify the installation.

hardware

Both Intel and Alpha based platforms provided by the new HP support Linux. This HOWTO focuses on the ProLiant server platforms. For more details on tested and certified ProLiant servers, visit www.compaq.com/products/software/linux/.

ProLiant servers

To view the ProLiant support matrix, visit www.compaq.com/products/servers/linux/certMatrix.html.

Descriptions of ProLiant servers can be found at www.compaq.com/products/servers/platforms/index.html.

storage controllers

The Wide Ultra2 SCSI and Wide Ultra2 SCSI-3 Controller series are based on Symbios Logic (LSI Logic) chips, while the Wide-Ultra3 SCSI controllers are based on Adaptec technology. The Linux 2.4.x kernel supports these controllers and includes driver support for the Compaq Smart Array Controller family, the Compaq 64-Bit/66 MHz Fibre Channel Host Adapter, and the Compaq Smart Array 5300 Controller. Compaq storage drivers and a Fibre Channel Host Adapter patch are available on the Compaq Open Source website at www.opensource.compaq.com/.

network interface controllers (NICs)

The latest ProLiant servers ship standard with either Intel or Broadcom based chipsets.

The Intel chipset adapters for the 10/100-based adapters (Compaq NC31XX Fast Ethernet NIC) use the Intel e100 driver. The Intel chipset supporting gigabit fiber (Compaq NC61XX Gigabit Server Adapter) and gigabit copper 10/100/1000 (Compaq NC71XX Gigabit Server Adapter) uses the Intel e1000 driver.

Please note that during OS installation the default driver may be the eeepro100 driver developed by Donald Becker, the founder of SCYLD. This driver is not the Compaq supported driver. The driver shipping with the OS can be found on the OS media at `/lib/modules/{kernel-version}/kernel/drivers/net`. If the default e100 or e1000 driver does not work with your adapter, then please use the latest Compaq supported Intel driver at the following location:

www.compaq.com/support/files/networking/nics/index.html.

The Broadcom chipset supports gigabit fiber (Compaq NC67XX Gigabit Server Adapter) and gigabit copper 10/100/1000 (Compaq NC77XX Gigabit Server Adapter). The driver supporting these adapters is the bcm5700 driver. The driver shipping on the OS media can be found at `/lib/modules/{kernel-version}/kernel/drivers/net`. If the default bcm5700 driver does not work with your adapter, then please use the latest Compaq supported Broadcom driver at the following location: www.compaq.com/support/files/networking/nics/index.html.

Older ProLiant servers may ship with TLAN based chipsets or Compaq NetFlex-3 adapters. The module supporting these adapters is the TLAN driver. The driver shipping on the OS media can be found at `/lib/modules/{kernel-version}/kernel/drivers/net/`. If the default TLAN driver does not work with your adapter, then please use the latest Compaq supported TLAN driver at the following location: www.compaq.com/support/files/networking/nics/index.html.

hardware configuration

Depending on which system you will be installing Red Hat Linux on, the hardware must first be configured using SmartStart or the ROM-Based Setup Utility (RBSU), or both. Additionally, if the system has an array controller, the Array Configuration Utility (ACU) or ROM-Based Array Configuration Utility <F8> must be used to configure the drives.

ROM-based setup utility (RBSU)

RBSU is a utility that allows users to easily configure ProLiant servers. This utility provides similar functionality to the system configuration utility. For example, it allows a user to set the date and time, boot controller order, hardware interrupts, and advanced system settings. The first time you power up the server, the system will prompt you to enter RBSU, select an operating system, and select a language. Default configuration settings are made at this time and can be changed later. To load RBSU, press F9 when prompted to do so at POST.

disk partitioning

Perhaps the most challenging aspect of a Linux installation is disk partitioning. You can choose to perform automatic partitioning or to partition the disk manually.

If you do not feel comfortable about manually partitioning your system, Compaq recommends that you select automatic partitioning. However, if you do not want Linux to be installed on your Master Boot Record (MBR) or if you want to use a boot manager other than LILO, do a manual installation.



CAUTION: Using automatic partitioning will remove all data on existing partitions.

understanding linux partition names and device names

Partition names consist of a device name, device number, and partition number. Here are some examples:

```
Device + Device Number + Partition Number = Full device name

/dev/sd + a + 2 = /dev/sda2 = 2nd primary partition on 1st SCSI disk drive

/dev/sd + a + none = /dev/sda = 1st SCSI disk drive

/dev/hd + c + none = /dev/hdc = MBR on 3rd IDE device

/dev/ida/ + cx + dy + pz = controller x on logical drive y with a
partition number of z.
```

Primary partitions are numbered from 1 to 4. An extended partition takes up one primary partition number. Logical drives in the extended partition always start at 5 and go up.

LILO can load most operating systems including the Compaq System Partition. To boot to another partition you should add a section similar to the following:

```
other=/dev/sda3
```

```
label=F10
```

```
table=/dev/sda
```

Notes:

- The first line-other=/dev/sda3-should point to the partition to boot.
- The second line-label=F10-shows up when you press **Tab** at the LILO prompt.
- The third line-table=/dev/sda-needs to point to the MBR of the above named partition.

Changes in `/etc/lilo.conf` should be saved and `/sbin/lilo` run. You should be able to boot to your other choice by typing the appropriate label at the lilo: prompt. Press the **Tab** or **?** to see your choices.

notes on /boot

For systems with the Compaq F10 Partition (Support System Configuration Utility or SCU), here is the recommended method of installation:

- /boot should be a primary partition (partition # 1-4).
- /boot should not be a logical drive (partition #5 or higher).
- /boot should be marked active.
- /boot should be below the 1024 cylinder limit. It is preferred to have /boot immediately following the Compaq F10 Partition; however, most recent versions of LILO do not have the 1024 limit.
- LILO should be installed to the /boot partition and not to the MBR (Master Boot Record). Installing LILO to the MBR prevents the F10 key from correctly starting the System Configuration Utility on boot.

For systems without the F10 partition (F10 BIOS – ROM Based Setup Utility or RBSU), here is the recommended method of installation:

- /boot can be either a primary partition or logical drive. Logical drives reside in the extended partition.
- /boot will not need to be marked active. Logical drives may not be marked active.
- /boot will need to be below the 1024 cylinder limit. It is preferred to have /boot at the front of the drive; however, most newer versions of LILO do not have the 1024 limit.
- LILO should be installed to the MBR.

distributions

Not all Linux distributions will automatically partition the hard drive according to the guidelines described above. Multiple primary partitions (hidden system partitions, Windows partitions, etc.) may confuse some utilities. If the boot partition is a logical drive (in the extended partition), the system cannot boot without special care. To access Linux, LILO will need to be installed onto the MBR, an alternate boot manager will need to be used, or a Linux boot floppy will need to be used.

The DISK DRUID Utility is bundled with many Linux distributions and aids greatly in partitioning the hard drive. Many distributions also offer the FDISK utility (or CFDISK utility) to perform this function and to provide more control over the procedure. If FDISK is needed, you may need to enter the Expert Installation to gain access to this utility.

Note: In newer distributions, DISK DRUID has been altered so that if you create /boot as the very first partition, it creates it as a primary partition.

installation process

This section outlines several installation procedures for SuSE Linux distributions. You may also check the archive located at www.compaq.com/products/servers/linux/archive-howto.html for older distribution versions.

ProLiant essentials rapid deployment pack installation

The ProLiant Essentials Rapid Deployment Pack for ProLiant servers is an automated solution for multi-server deployment and provisioning, enabling companies to quickly and easily adapt to changing business demands.

Please refer to the documentation provided with the ProLiant Essential Rapid Deployment Pack CD or the website www.compaq.com/products/servers/management/rapiddeploy.html for instructions on how to install SuSE Linux and all support software using the ProLiant Essentials Rapid Deployment Pack CD.

ProLiant essentials integrated lights-out installation

The ProLiant Essentials Integrated Lights-Out (iLO) integrates industry leading Lights-Out functionality and system board management capabilities on selected ProLiant servers.

To view which servers support installation using the ProLiant Essentials Integrated Lights-Out (iLO), visit: www.compaq.com/manage/supported-servers.html.

Please refer to the documentation provided with your server or the website www.compaq.com/manage/ilo-description.html for instructions on how to install SuSE Linux and all support software using the Virtual Floppy option within the ProLiant Essentials Integrated Lights-Out (iLO) product.

smartstart installation

SmartStart configures your server hardware including options, such as an array controller, if present. In addition to hardware configuration, SmartStart loads optimized drivers, and assists with the software installation. It also provides functionality for integrating operating systems on ProLiant servers to achieve optimum reliability and performance. Integration Management features extend the benefits of SmartStart and facilitate consistency and reliability of server deployment and maintenance.

SmartStart ships standard with most ProLiant servers. You can also take advantage of the SmartStart Subscription Service for new and updated releases of the SmartStart CD, Insight Manager, and ProLiant Server Support Software. To order a subscription, either call 1-800-573-1099 or order online at www.compaq.com/SmartStart.

We recommend that you begin with SmartStart when installing Linux on a ProLiant server. Always use the latest version of SmartStart for your installation. SmartStart supports manual path installation of Linux.

If the ProLiant server has previously been configured, you will need to start by erasing the system. This step ensures that you begin the installation process from a known non-configured state.

Note: Running the System Erase Utility removes all system configuration and erases all data from the hard drives.

1. Boot from the SmartStart CD. If SmartStart detects that the system has been previously configured, you will be presented with the System Utilities screen.
2. Select **Run System Erase Utility** from the Main menu, then select **Yes**. The System Erase Utility will run in text mode. When the system has been erased, you will receive a message to power cycle the server.
3. Reboot to the SmartStart CD.

4. Begin the installation process.
 - Select the language and locale settings and accept the license agreement.
 - As the desired SmartStart Path, select **Manual Configuration | Begin**.
5. Select **Linux** in the Operating System Selection screen, select **Next**, and then select **Continue**. Depending on the server type, SmartStart will automatically run the System Configuration Utility or RBSU to configure the operating system and restart the server.
6. If applicable, configure the Compaq Array Controller using the Array Configuration Utility (ACU).
7. Remove the SmartStart CD when prompted to do so. You will see a text message stating, "Removing SmartStart files. Please wait." The system will then reboot.
8. As the system reboots, insert the Linux installation CD-ROM (or floppy, if required). The system will then boot off the Linux installation disk.
9. Proceed with appropriate Linux Installation.

SuSE Linux installations

To view which SuSE Linux versions are supported on your server, visit:
www.compaq.com/products/servers/linux/certMatrix.html.

general installation

1. Retrieve the NIC and storage drivers from the Server Support Software Download Center website before starting the installation:
www.compaq.com/support/files/server/us/index.html.
2. Configure the server using the SmartStart CD:
 - Run SmartStart on the server by selecting **Erase Utility | Manual | Linux OS**.
 - [See the "smartstart installation" section before proceeding with these instructions.](#)
3. Insert the SuSE CD when prompted.
4. Select **New installation** when prompted.
5. Select **Custom Partitioning – For Experts**.
6. Create the partitions:
 - Create the Primary /boot partition first (+30Megabytes -primary).
 - Create the swap partition (2 times the amount of RAM or 500 Megabytes).
 - Create the / (root) partition (-rest).

7. Select the installation packages.
8. Select **Custom LILO Installation**.
9. If using RBSU, write LILO to the boot disk ('MBR').
10. Check **Use linear option** and check **Active Partition**.

ProLiant e-Class
server blades
installation

To install SuSE Linux to the ProLiant e-Class server blades, use the ProLiant Essentials Rapid Deployment Pack. Follow the instructions provided with the software.

ProLiant ML370
G3 server
installation

The ProLiant ML370 G3 server requires a bcm5700 driver version 2.2.22 (or newer) to function properly.

1. During a SuSE Linux Enterprise Server 7 installation, configure the hardware including the NIC. The installer will see the Broadcom network device, enter the IP addresses and host name information. When applying the changes, there will be an error that eth0 failed to start. Finish installation and reboot.
2. After reboot, login as root.
3. Copy the driver source file to the system.
4. Enter the following commands: (x.x.x. = kernel version)

```
cp /boot/vmlinuz.config /usr/src/linux-x.x.x.SuSe/.config
cp /boot/vmlinuz.version.h /usr/src/linux-x.x.x.SuSe/include/linux/version.h
cp /boot/vmlinuz.autoconf.h /usr/src/linux-x.x.x.SuSe/include/linux/autoconf.h
cd /usr/src/linux
make oldconfig
make dep
```

5. From the directory where the Broadcom driver source file was copied to, create and install the bcm5700 rpm by entering the following:

```
rpm -ivh bcm5700 .x.x.x.src.rpm (x.x.x. = driver version)
cd /usr/src/packages
rpm -bb SPECS/bcm5700.spec
rpm -ivh RPMS/i386/bcm5700.x.x.x/i386.rpm
```

6. Edit the `/etc/modules.conf` file, and change the `eth0` line from **off** to **bcm5700**.

7. Run YaST or YaST2 to complete the network configuration.

ProLiant BL20p
server installation

Installing SuSE Linux on the ProLiant BL20p server requires either the ProLiant Essentials Rapid Deployment Pack or the ProLiant Essentials Integrated Lights-Out. Please also view the *Installing Linux on the ProLiant BL20p Server HOWTO* that is located here:
www.compaq.com/products/servers/linux/compaq-howto.html.

**compaq
advanced
server
management
(ASM) driver
and
integrated
management
log (IML)
viewer**

The Compaq Advanced Server Management Driver (casm) collects and monitors important operational data on your server to ensure that the system is "healthy." Any abnormal conditions are logged into the Non Volatile RAM (also called the Integrated Management Log (IML)) and can be inspected by using the `cpqimlview` application. It is optionally sent to the Insight Manager thorough SNMP traps.

ProLiant servers are equipped with hardware sensors and firmware to monitor certain abnormal conditions such as abnormal temperature readings, fan failures, ECC memory errors, etc. The casm driver monitors these conditions and reports them to the administrator by printing messages on the console (preserved in `/var/log/messages`) and also logs the condition into the server's Integrated Management Log.

**ASM driver
features**

The following sections detail the features provided by the Compaq Advanced Server Management Driver.

system
temperature
monitoring

A ProLiant server may contain several temperature sensors. If the normal operating range is exceeded for any of these sensors, the Compaq ASM Driver does the following:

- Displays a message to the console stating the problem
- Makes an entry in the system health log
- Shuts the system down (optionally) to avoid hardware damage

Use the Compaq System Configuration Utility (RBSU) to control the shutdown option.

system fan
monitoring

If a cooling fan fails and there is no secondary "redundant" fan, the Compaq ASM Driver does the following:

- Displays a message to the console stating the problem
- Makes an entry in the system health log
- Shuts the system down (optionally) to avoid hardware damage

Use the Compaq System Configuration Utility (RBSU) to control the shutdown option.

If a secondary or "redundant" fan is present when a fan fails, the Compaq ASM Driver does the following:

- Activates the redundant fan if not already running
- Displays a message on the console

Makes an entry in the system health log

monitoring the
system fault
tolerant power
supply

If a redundant power supply is present, the power load is shared equally between all power supplies. If a primary power supply fails, the server automatically switches over to a backup power supply. The Compaq ASM Driver does the following:

- Monitors the system for power failure and for physical presence of power supplies
- Reports when the power supplies experience a change in shared power load
- Displays a message to the console stating the problem
- Makes an entry in the system health log

ECC memory
monitoring and
advanced
memory
protection

If a correctable ECC memory error occurs, the Compaq ASM Driver logs the error in the health log including the memory address causing the error. If too many errors occur at the same memory location, the driver disables the ECC error interrupts to prevent flooding the console with warnings (the hardware automatically corrects the ECC error). On servers with Advanced Memory Protection, the driver will attempt to log an error if a memory board has been inserted, removed, or incorrectly configured, and optionally if an Online Spare Switchover or Mirrored Memory engaged event occurs. The Compaq ASM Driver does the following:

- Displays a message on the console stating the problem
- Makes an entry in the system health log

This server feature is configured using the Compaq System Configuration Utility.

automatic server
recovery (ASR)

The Automatic Server Recovery is implemented using a "heartbeat" timer that continually counts down. The driver frequently reloads the counter to prevent it from counting down to zero. If the ASR counts down to 0, it is assumed that the operating system is locked up and the system automatically attempts to reboot. Before rebooting, the Compaq ASM Driver does the following:

- Displays a message on the console stating the problem
- Makes an entry in the system health log.

This server feature is configured using the Compaq System Configuration Utility.

setup procedures

The Compaq ASM driver is available as an RPM file. As with every RPM file, you may install, query, refresh, and uninstall the package. For the remainder of this section, we discuss how to install and uninstall the package. We also show you how the driver should react during regular operation.

installing the driver

If you have a previous version of the Compaq ASM Driver installed, it is important to uninstall this version before installing the new RPM file. See the “uninstalling the driver” section for information on removing the driver.

After obtaining the RPM file, login as root and type the following to install the driver:

```
rpm -ivh cpqhealth-<version>-x.<distribution>.i386.rpm
```

The RPM file may have a different version number depending on supported systems and functionality. The distribution refers to the Linux distribution supported by the RPM. The RPM file has a binary that is compiled for the supported distribution with the default kernel. If you would like to install or create the RPM for a non-default kernel, you must also install the kernel sources for your compiled kernel.

In addition, the development packages required for rebuilding a kernel need to be present. Please use the following web page to determine if you will need to install the kernel sources and additional packages: www.compaq.com/products/servers/linux/certMatrix.html.

The driver will be inserted immediately. On systems with variable speed fans, you may notice that the fans will start spinning more slowly if the temperature is reasonably low. To check whether or not the driver is loaded properly, you might want to type (only available as system administrator or root):

```
lsmod
```

You should see an entry indication that two drivers have been inserted: (1) cpqasm and (2) cpqevt. The cpqasm driver should have a use count of two (2) while the cpqevt driver always has a use count of zero (0).

upgrading the driver

RPM provides the option to upgrade a package. Before upgrading, it is important to uninstall any RPM packages that are dependent on the health driver, such as the Management Agents and the Remote Insight Driver, since these packages are dependent on a specific health driver version. Attempting to install these packages on an unsupported health driver version may result in an unstable system. Type the following, in order, to uninstall any of these packages, if they are present on your system:

```
rpm -e cmanic  
rpm -e cmastor  
rpm -e cmasvr  
rpm -e cmafdtn  
rpm -e cpqgrid
```

To upgrade the health driver, type the following command:

```
rpm -Uvh cpqhealth-<version>.<distribution>.i386.rpm
```

Please note that if the upgrade option is used, the health driver will be stopped after installation to preserve system stability. Please upgrade any components dependent on the Compaq ASM Driver (cpqgrid, cmafdtn, cmasvr, cmanic, and cmastor).

Also, note that versions of cpqhealth prior to the 3.0.0 release cannot be upgraded. The previous version must be removed (`rpm -e cpqhealth`) and the newer version installed. The upgrade command shown above may be used to install.

To start the Health driver, type the following command:

```
/etc/init.d/cpqasm start
```

running the driver You will notice that once installed, the driver will be automatically loaded every time your server boots up.

For additional information and help, a man page is available by typing:

```
man cpqhealth
```

uninstalling the driver The uninstall procedure follows the RPM standard and is achieved by typing:

```
rpm -e cpqhealth
```

If the health driver is running, it will be shut down at this time. Should you reboot the system, the health driver will NOT be inserted at bootup time.

If you do not recall the version of the health driver installed, the following command may be used to discover the package version:

```
rpm -q cpqhealth
```

If you ever want to unload the driver, simply type (as system administrator):

```
rmmod cpqhealth
```

The health driver will be removed from your system. Should an error condition occur, the driver will log an entry to the system log and to the health log as well as to the (text) console. In case of an emergency, the health driver will attempt to shut your system down gracefully. Using the `rmmod` command will not prevent the driver from being inserted at bootup time.

custom builds and packaging The health driver is designed to be installed on "custom" or patched Linux kernels. There is a source "wrapper" file that abstracts the Linux functionality from the remainder of the driver code. If there is a Linux kernel symbol mismatch, the boot time script, `"/etc/init.d/cpqasm"` will check to see if the Linux kernel source files are present. If so, the script will automatically rebuild and load the driver. If the Linux kernel source files are not present, a warning message will be displayed.

The `cpqhealth` RPM lands the package contents in the `"/opt/compaq/cpqhealth"` directory. A special script named `"custom_cpqhealth.sh"` resides in the previously mentioned directory. This script is used to rebuild the `cpqhealth` RPM for a custom (or post release) Linux kernel. The purpose of providing this tool is to allow easy remote deployment of a custom `cpqhealth` RPM to servers where kernel source or build tools are not available.

The requirements for the “custom_cpqhealth.sh” to work are:

- All kernel sources for all kernel patches must be installed on the server.
- The link “/lib/modules/`uname -r`/build must exist and be linked to the directory containing the patched kernel sources.
- The standard build tools such as gcc, ld, make, and touch must be loaded on the server.

To create a custom health driver (after the requirements have been met), execute the following:

```
cd /opt/compaq/cpqhealth
sh custom_cpqhealth.sh
```

Due to the volatility of the Linux kernel sources and libraries, there may be some compiler or linker errors that will need to be resolved in the Compaq ASM Driver “wrapper” file casmw_linux.c. Standard API’s have been utilized to avoid future compatibility issues. The completed packages will be copied to the /opt/compaq/cpqhealth directory. The RPMs are versioned as “CUSTOM” to distinguish these RPMs from the standard drivers. The “custom_cpqhealth.sh” script will allow the user to customize the versioning of the created RPM.

behind the scenes

A prototype of the driver is inserted in /lib/modules/Compaq/drivers/<kernel-type> where <kernel-type> is “up” for single processor kernels and “smp” for multiple processor kernels. This allows the manual insertion of the health driver from anywhere in the file system.

The health driver exposes the following device nodes that are used to control its operation. These character device nodes are dynamically allocated a major number, and the minor numbers are assigned as follows:

0 = /dev/cpqhealth/casm	
1 = /dev/cpqhealth/casr	Automatic Server Recovery
2 = /dev/cpqhealth/cecc	ECC Memory
3 = /dev/cpqhealth/ccsm	Legacy Interface
4 = /dev/cpqhealth/cmca	Machine Check Architecture
5 = /dev/cpqhealth/cside	Legacy Interface
6 = /dev/cpqhealth/cevt	Event Log
7 = /dev/cpqhealth/cpci	Legacy interface
8 = /dev/cpqhealth/cdt	Data Table
9 = /dev/cpqhealth/cpqw	Redirector interface
10 = /dev/cpqhealth/crom	EISA CROM
11 = /dev/cpqhealth/cram	Legacy interface

In order to insert the driver at bootup time, a link to /etc/init.d/cpqasm is created in the /etc/rc3.d and /etc/rc5.d directories. Should there be a problem with the driver, you can bring the system up in maintenance mode (INITSTATE=1) to correct the issue.

console messages When events occur outside of normal operations, the health driver may display a console message. The following sections list the console messages that the health driver provides as it monitors system health.

View the Integrated Management Log (IML) to identify where the fault lies when failures are reported, and take the appropriate action.

memory The Compaq ASM Driver may report the following memory messages to the console:

Message:	A memory module has exceeded its threshold of correctable errors. Monitoring of ECC errors has been turned off.
Description:	ECC errors will no longer be monitored, due to an excessive amount of memory errors.
Action:	ECC memory may be faulty, and needs to be replaced.

Message:	Excessive ECC memory errors detected and automatically corrected. Online Spare Memory engaged.
Description:	An excessive amount of memory errors caused the Online Spare Memory to be engaged; the module with excessive errors has been copied to the online spare module to prevent interruption of service.
Action:	The memory module may be faulty, and needs to be replaced.

Message:	A multi-bit memory error occurred on Memory Board #. The memory board mirror has been engaged.
Description:	An uncorrectable error occurred. The mirrored board is engaged to prevent interruption of service.
Action:	The memory is faulty, and needs to be replaced.

Message:	Memory board # has a configuration error.
Description:	The specified board may be missing DIMMs or may have mismatched DIMMs.
Action:	Correct the configuration of the specified board.

Message:	Memory board # has been removed.
Description:	This is a notification message. No action is required.

Message:	Memory board # has been inserted.
Description:	This is a notification message. No action is required.

If a memory module fails, view the IML to identify the faulty memory module. Plan for maintenance downtime and replace the module.

thermal sensors (temperature)

The Compaq ASM Driver may report the following temperature messages to the console:

```
Message:      Temperature sensor # has been disabled.
Description:   The indicated temp sensor has been disabled.
Action:       None.
-----
Message:      Approaching Dangerous Temperature!  The Thermal Sensor (#)
              located <location> is reporting overheating conditions.
Description:   A thermal sensor is reporting high temperatures.  Thermal
              shutdown may be triggered if the temperature increases
              beyond the threshold.
Action:       None.
-----
Message:      A dangerous temperature condition has been detected by a
              Thermal Sensor (#) located <location>.
Description:   The temperature has exceeded the threshold.  Shutdown will
              occur.
Action:       None, shutdown will automatically occur.
-----
Message:      Normal conditions have returned to a Thermal sensor (#)
              located <location>.
Description:   The temperature has returned to a normal, non-dangerous
              level.
Action:       None.
-----
Message:      Automatic Operating System Shutdown Initiated Due to
              Overheat Condition.
Description:   This message is generated either from internal temperature
              sensors or storage controllers detecting a critical thermal
              event.
Action:       The operating environment is too warm and requires better
              cooling.
```

If the temperature exceeds the acceptable threshold, ensure that all system fans are functional and that airflow to all system vents is not obstructed. Check room temperature and make sure air conditioning is not turned off at night.

Message: Fan # located <location> has been inserted.

Description: The indicated fan has been inserted.

Action: None.

Message: Fan # located <location> has been removed.

Description: The indicated fan is no longer present.

Action: None required. Optionally, replace fan.

If a critical fan has failed, replace the specified fan immediately, even if the fan appears functional (spinning). If a redundant fan has failed, replace the fan during scheduled maintenance.

power supplies

The Compaq ASM Driver may report the following power supply messages to the console:

Message: Monitoring of power supply # has been disabled.

Description: Monitoring of the indicated power supply has been disabled because the interrupt threshold was exceeded. This is an indication that the power supply is generating spurious interrupts.

Action: The indicated power supply may need to be replaced.

Message: A Power Supply (Power Supply #) located <location> is not providing power. Please confirm the power cord is correctly attached.

Description: Power has been lost to one or more power supplies.

Action: Check power cord.

Message: A Power Supply (Power Supply #) located <location> is not providing power. Due to an EPROM reading failure.

Description: The indicated power supply is not functioning.

Action: None.

Message: A Power Supply (Power Supply #) located <location> is not providing power. Due to a failed internal power supply fan.

Description: The indicated power supply is not functioning because an internal power supply fan has failed.

Action: Replace power supply.

Message: A redundant Power Supply (Power Supply #) located <location> has returned normal.

Description: The indicated power supply is functioning.

Action: None.

Message: Power Supply system located <location> is no longer redundant.

Description: Due to the failure or removal of a power supply, the indicated system is no longer redundant.

Action: Replace, or add redundant power supply.

Message: Power Supply system located <location> is now redundant.

Description: The indicated power supply is now redundant.

Action: None.

Message: Power Supply # located <location> has been inserted.

Description: The indicated power supply has been inserted.

Action: None.

Message: Power Supply # located <location> has been removed.

Description: The indicated power supply is no longer present.

Action: Replace power supply.

Message: Fan in Power Supply (Power Supply #) has failed.

Description: The fan in the indicated power supply is no longer functioning.

Action: Replace power supply.

Message: Fan in Power Supply (Power Supply #) has returned to normal.

Description: The fan in the indicated power supply is now functioning.

Action: None.

```

Message:      A dangerous temperature condition has been detected by the
                  Thermal Sensor in Power Supply (Power Supply #).

Description:  The temperature has exceeded the threshold. Shutdown will
                  occur.

Action:       None, shutdown will automatically occur.

-----

Message:      Normal conditions have returned to the Thermal sensor in
                  Power Supply (Power Supply #).

Description:  The temperature has returned to a normal, non-dangerous
                  level.

Action:       None.

```

Check the status and connections on all power supplies when failures are reported. If a power supply has failed, replace the specified power supply.

processor power modules

The Compaq ASM Driver may report the following processor power messages to the console:

```

Message:      A Processor Power Module (#) has failed (slot #, socket #).

Description:  The indicated power module has failed.

Action:       None.

-----

Message:      A Processor Power Module (#) located in (slot #, socket #)
                  has returned to normal operation.

Description:  The indicated power module is now functioning.

Action:       None.

-----

Message:      Processor Power Module sub-system located in (slot #, socket
                  #) is no longer redundant.

Description:  The indicated power module sub-system is not redundant, due
                  to the removal or failure of a Processor Power Module.

Action:       Replace the faulty or missing module.

-----

Message:      Processor Power Module sub-system located in (slot #, socket
                  #) is now redundant.

Description:  The indicated sub-system is now redundant.

Action:       None.

```

If a processor power module has failed, replace the specified processor power module.

compaq integrated management log viewer (IML viewer)

The information in the Integrated Management Log (IML) may also be leveraged through the IML Viewer application, which is also included in the RPM file. The IML records system events, critical errors, power-on messages, memory errors, and any catastrophic hardware or software errors that typically cause a system to fail. The IML Viewer allows the manipulation of this data.

running the IML viewer

The IML Viewer is an application that runs in the X-Windows environment. Type the following to run the IML Viewer:

```
cpqimlview
```

The Compaq Integrated Management Log Viewer automatically displays the current entries in the IML as shown in Figure 1.

figure 1. IML viewer event entries

Description	Class	Severity	Count	Update Time	Initial Time	Event ID
Message Log Cleared by root	Maintenance Clear Log	Information	1	02/27/02 10:30	02/27/02 10:30	0
Temp sensor overheat at 25 degrees	Machine Environment	Repaired	1	02/27/02 10:32	02/27/02 10:31	1
Temp sensor overheat at 25 degrees	Machine Environment	Repaired	1	02/27/02 12:53	02/27/02 12:52	2
Automatic Server Recovery engaged	ASR Lockup	Critical	1	03/13/02 10:23	03/13/02 10:23	3
Temp sensor overheat at 24 degrees	Machine Environment	Repaired	1	03/27/02 14:25	03/27/02 14:25	4

Each event in the IML Viewer has one of the following statuses to identify the severity of the event:

- Information - General information about a system event
- Repaired - An indication that this entry has been repaired
- Caution - An indication that a non-fatal error condition has occurred
- Critical/Failed - A component of the system has failed

The severity of the event and other information in the IML Viewer helps to quickly identify and correct problems, thus minimizing downtime. The IML Viewer allows several capabilities to enhance the ability to identify, correct, and document server health.

Table 1 below describes the menu options available.

table 1. IML viewer menu options

option	description
file menu	
Open	Open a previously saved file and display the contents in the IML Viewer.
Save As	Save the current entries of the IML to a file. This operation does not affect the current contents of the IML. This allows archival of IML data for input into a text editor or spreadsheet application or other IML Viewer utility. The File Name entry should specify the full path for the desired file name. If no path is specified, the file will be saved in the current directory.
Exit	Close the IML Viewer window and exit the application.
log menu	
Clear All Entries	Clear the IML. Compaq recommends saving the current contents into a file before emptying the log.
Mark As Repaired	Mark a specific entry as repaired.
Add Maintenance Note	Mark a specific entry with maintenance information.
view menu	
Filter	Filter IML events to display only desired event types. Event types, such as Class, Status, Update Time, and Initial Time, can filter IML events.
Refresh Now	Re-read and re-display entire current IML.
Sort Events	Sort IML events by event types; for example, sort by Description, Class, Status, Count Initial Time, Update Time, or ID.

remote insight driver and iLO management interface driver

Remote Insight Lights-Out Edition allows browser access to ProLiant servers through a seamless, hardware-based, OS-independent graphical remote console.

The Remote Insight Driver enables the routing of SNMP traffic out of the Remote Insight Lights-Out Edition card and the Remote Insight Lights-Out Edition II card. These cards are equipped with an integrated NIC that is used to manage the card through its web interface or through Insight Manager. A further task of the driver is to expose the Integrated Management Log of the system through the management cards.

The card itself operates without any additional driver (for example, the remote log in and virtual floppy features are available). The driver only enhances the capabilities of the card.

On some servers, this feature will be integrated on the system board of the server. This feature is called Integrated Lights-Out (iLO).

management hardware

The Remote Insight Driver is supported on the Remote Insight Board Lights-Out Edition card and Remote Insight Board Lights-Out Edition II card. Documentation on these cards can be found at www.compaq.com/manage/remote-lightsout.html. To view what servers and operating systems are supported with the Remote Insight Board Driver, view: www.compaq.com/products/servers/linux/certMatrix.html.

To view what servers and operating systems the Integrated Lights-Out Management Interface Driver supports, view: www.compaq.com/products/servers/linux/certMatrix.html.

setup procedures

This section covers prerequisites for installation and procedures for installing, upgrading, and removing the Compaq Remote Insight Driver and Compaq iLO Management Interface Driver for Linux.

prerequisites

The Compaq Health Driver for Linux must be installed before installing the Compaq Remote Insight Driver and Compaq iLO Management Interface Driver.

IMPORTANT: Even though the Health Driver can be loaded on non-default kernels, the Remote Insight and iLO Management Interface Drivers work only on the default kernels of supported Linux distributions. For advanced troubleshooting with errata kernels, please view the appropriate HOWTO located here: www.compaq.com/products/servers/linux/compaq-howto.html.

The Health Driver, Remote Insight Driver, and iLO Management Interface Driver can be obtained at www.compaq.com/products/servers/linux/linux-drivers.html.

You can check if the Compaq Health Driver is running by typing:

```
%lsmod
```

Note: Look for 'cpqhealth' in the list.

installing the driver

To install the Remote Insight Board Driver type the following at a command prompt:

```
%rpm -ivh cpqrid-<version>.<distribution>.i386.rpm
```

The default location for the crid module is: /lib/modules/'uname-r'/misc/cpqrid.o

The Remote Insight Board Driver can be manually inserted by typing:

```
%insmod cpqrid.o
```

Online documentation can be found by typing:

```
%man cpqrid
```

To check if the driver is already loaded type:

```
%lsmod
```

Note: Look for 'cpqrid' in the list.

To install the Integrated Lights-Out Driver, type the following at a command prompt:

```
%rpm -ivh cpqci-<version>.<distribution>.i386.rpm
```

The default location for the crid module is: /lib/modules/Compaq/drivers/`kernel type`/cpqci.o

The Integrated Lights-Out Driver can be manually inserted by typing:

```
%insmod cpqci.o
```

To check if the driver is already loaded type:

```
%lsmod
```

Note: Look for 'cpqci' in the list.

upgrading the
driver

If you are upgrading from a previous version of the Remote Insight Driver, you can type:

```
%rpm -Uvh cpqgrid-<version>.<distribution>.i386.rpm
```

After upgrading the driver you will need to manually restart the driver by typing:

```
% /etc/rc.d/init.d/cpqgrid start
```

removing the
driver

To remove the Remote Insight Board Driver type:

```
%rpm -e cpqgrid
```

The driver can be manually removed by typing:

```
%rmmod cpqgrid
```

To remove the Integrated Lights-Out Driver type:

```
%rpm -e cpqci
```

The driver can be manually removed by typing:

```
%rmmod cpqci
```

integration with
management
agents

The Remote Insight Board Driver and the Integrated Lights-Out Management Interface Driver work with the Management Agents. With the Remote Insight Driver loaded, you can view and manage the server using the Remote Insight interface. Management Agent installation and configuration instructions can be obtained at www.compaq.com/support/files/server/us/WebDoc/Linux/Linux.pdf.

**compaq rack
infrastructure
interface
service**

The Compaq Rack Infrastructure Interface Service (cpqriis) opens and sustains communication with the Integrated Lights-Out management controller.

This communication link is vital to obtain a connection to the ProLiant BL p-Class enclosure management controllers in the back of the rack. If it is not run, other applications, such as the Rack Upgrade Utility and the Rack Agent will not work.

The service also receives any type of alerts from the Rack Infrastructure and logs those into the OS logging facility.

hardware

To view what servers and operating systems are supported with the Compaq Rack Infrastructure Interface Service, view: www.compaq.com/products/servers/linux/certMatrix.html.

setup procedures

This section covers prerequisites for installation and procedures for installing and removing the Compaq Rack Infrastructure Interface Service for Linux.

prerequisites

The Compaq Health and Wellness Driver and the Compaq iLO Management Interface Driver are required for the Compaq Rack Infrastructure Interface Service to load properly. These drivers along with the Compaq Rack Infrastructure Interface Service can be obtained at www.compaq.com/products/servers/linux/linux-drivers.html.

installing the service

To install the Compaq Rack Infrastructure Interface Service, type the following at a command prompt:

```
%rpm -ivh cpqriis-<version>.<distribution>.i386.rpm
```

The package should install and immediately start the service.

This service is started from a run level script named "cpqci." It can be invoked manually by typing:

```
service cpqci start

or

/etc/rc.d/init.d/cpqci start

or

/etc/rc.d/cpqci start

or

/sbin/cpqriis
```

The options to invoke /sbin/cpqriis are as follows:

<u>Option</u>	<u>Description</u>
-F	This will "daemonize" the process and will start the daemon up in a production level environment. Usage recommended. An easier way to accomplish this task is to execute the "cpqci" run level script.
-D	This will start the service in a debug environment. stdin and stdout will go to the console; typing e will quit the daemon. Alerts are logged onto the same text console.
-?	Usage printout.

The service's man page may be viewed by typing `man cpqriisd` at the command prompt.

On startup, the service dumps out the "rack topology" (which is the enclosure order from bottom to top with all the pertinent information) onto the screen. This is also logged into `/var/log/messages`.

Subsequently, rack events that are fielded from iLO into the Linux will be echoed to the consoles, as well as `/var/log/messages`.

The service acts as an enabler for other ProLiant value-add software, such as the Rack Agent and the Rack Upgrade Utility.

If the service goes away after a few seconds, there is a failure to initiate communication with the iLO management controller. The failure reason will be logged into the message log. If the service is stopped, dependent applications such the Rack Firmware Upgrade Utility will terminate as well.

removing the
service

To remove the Compaq Rack Infrastructure Interface Service, type:

```
%rpm -e cpqriis
```

The service can be manually removed by typing:

```
%rmmod cpqriis
```

using the
compaq BL rack
upgrade utility

The Compaq BL Rack Upgrade Utility is packaged and installed with the Rack Infrastructure Interface Service. This utility upgrades the firmware on the management controllers in the rack.

```
cpqblru [-eq1?] [-a address1, address2,...] [-c chassis1, chassis2,...]
```

<u>Parameter</u>	<u>Description</u>
-a address1,address2,...	This optional parameter considers only enclosures with ICMB addresses address1, address2, etc. The list of addresses must be composed of 16-bit quantities separated by commas. No white spaces are allowed in between. If no comma-separated list is given, all possible ICMB addresses in the rack are considered.
-c chassis1,chassis2,...	This optional parameter considers only enclosures with positions chassis1, chassis2, etc. that are counted from the bottom. The list must be composed of small numbers that are legal positions in the rack. No white spaces are allowed in between the commas and the numbers. A list such as 1,2,5 for instance, would signify the bottommost, second-to-bottommost, and fifth-to-bottommost enclosure.
-e	Disregard the local enclosure (for example, the enclosure containing the server from which we flash) in the flashing. This parameter is given in conjunction with <code>-a</code> or <code>-c</code> .
-l	Disregard anything but the local enclosure (for example, the enclosure containing the server from which we flash). This parameter should not be given with <code>-a</code> or <code>-c</code> .
-q	This parameter queries the chassis positions, their serial numbers, and their firmware status.

The utility's man page may be viewed by typing `man cpqblru` at the command prompt.

general trouble- shooting

This section details general known issues with running SuSE Linux on ProLiant servers and provides information about resolving them.

issue 1	linux hangs during boot when starting networking
possible cause	Bugs are located in the eeepro100 driver.
possible solutions	Try using the Intel e100.o device driver available for download at www.compaq.com/support/files/server/us/locate/2882.html . Check the EEPro100 Mailing List archive, available at www.tux.org/hypermail/linux-eeepro100/ , because it is another good source of information.
issue 2	LILO or linux hangs during boot
possible causes	<ul style="list-style-type: none"> • /boot is above the 1024 cylinder limit. • Problem is located in /etc/lilo.conf. • Problem is located in /etc/fstab. • Linear addressing might be needed for SCSI drives.
possible solutions	<ul style="list-style-type: none"> • Use FDISK to make sure the /boot partition is one of the first partitions on the drive and that it does not extend beyond cylinder 1024. • Rerun /sbin/lilo. Put LILO into the Master Boot Record (MBR). This means omitting any digits at the end of the first line as follows: boot=/dev/sda or boot=/dev/ida/c0d0. • Verify that all the information in /etc/fstab is correct. • Boot to the floppy created during installation. Add the keyword Linear to the /etc/lilo.conf file or run /sbin/lilo -l.
issue 3	black screen after power-on-self-test completes (blinking cursor in the upper left-hand corner)
possible causes	<ul style="list-style-type: none"> • No active partition. • /boot is in the extended partition. • Master Boot Record (MBR) is corrupt. • The problem is with /etc/lilo.conf. • LILO is not using linear mode.
possible solutions	<ul style="list-style-type: none"> • Verify that there is an active partition. • Verify that /boot partition is numbered less than 5. • Repair the Master Boot Record with DOS 6.22 or the Windows 95 boot disk using the FDISK /mbr command. • Put LILO into the Master Boot Record. This means omitting any digits at the end of the first line. • Edit your /etc/lilo.conf file if you are installing to a ProLiant ML330 server or ProLiant ML350 server and LILO is installed on the master boot record. Make sure the keyword linear appears in the top section.

management trouble- shooting

This section describes common problems that might occur during install and operation of the Compaq ASM Driver. In most cases, a workaround is available which shall be described in the table below.

issue 1	non certified machines
symptom	<p>When the Health and Wellness Driver RPM file is installed you will get the following message:</p> <pre>casm: This driver is not supported on this system</pre> <p>The driver is not inserted into the list of modules.</p>
cause	The Linux Compaq ASM Driver is only certified for a subset of systems that Compaq offers. The driver is deactivated for all other hardware and will not function by design.
workaround	There is no workaround since this driver was designed to function in this manner.
issue 2	health driver does not install or boot correctly
symptom	When the Compaq Advanced Server Management RPM file is installed there are messages logged to the console and the /opt/Compaq/cpqhealth/cpqhealth_boot.log file.
cause	The Compaq Advanced Server Management RPM only ships binaries for standard "out of the box" kernels. The installation and boot scripts, however, are intelligent, and if kernel symbol mismatches are detected, the scripts will seek out the appropriate kernel source libraries and attempt to automatically rebuild.
workaround	<p>The list below is not an exhaustive list, but it should provide you with some guidance of what to look for. The "gcc" compiler, linker, insmod, etc. may generate other messages. If the Linux kernel of the server is very different from the boxed (or shipping) Linux kernel, some modification to the Linux wrapper (source) module may be required.</p> <pre>"The Compaq Health Event Logging module failed to load!"</pre> <pre>"Linux Kernel Symbol Conflict - Attempting rebuild to resolve"</pre> <p>The message above is an indication that the binary module shipped with the RPM package does not match the installed kernel. The boot script (/etc/init.d/cpqasm) will automatically attempt to locate the matching source, rebuild the wrapper code and relink the driver to the current kernel.</p>

```
"WARNING! The cpqhealth RPM is not compatible with this
kernel."
```

```
"Remove and install again the cpqhealth RPM to correct."
```

```
"See /opt/compaq/cpqhealth/cpqhealth_boot.log "
```

The "gcc" compiler or linker errors usually precede the message above. All messages are saved in the "/opt/compaq/cpqhealth/cpqhealth_boot.log" file. If the Linux kernel symbols have had significant modifications since the last "released" kernel, you may have to resolve some issues in the wrapper files: (/opt/compaq/cpqhealth/casm.d/casmw_linux.c, /opt/compaq/cpqhealth/cevt.d/cpqevtw_linux.c).

```
"Looking for sources to build ${THIS_KERNEL}"
```

The message above is an informational message to indicate which Linux kernel has been detected and to let the user know that the rebuild process has begun.

```
"/lib/modules/${THIS_KERNEL}/build does not exist"
```

```
"This is an indication that the sources for this kernel
(${THIS_KERNEL}) are not loaded."
```

```
"Please load the appropriate sources to rebuild module".
```

The message above indicates that the sources to match the installed (or booting) Linux kernel version cannot be located. The directory structure listed in the message is the standard directory structure put down by all Linux kernel 2.4 releases.

```
"/lib/modules/${THIS_KERNEL}/build/include/linux/version.h
does not exist"
```

```
"Please load the appropriate sources to rebuild module".
```

The message above indicates that the required include file, "version.h", cannot be located on this system. This is usually an indication of a patched kernel without the matching Linux kernel (patch) sources being loaded.

```
"/lib/modules/${THIS_KERNEL}/build/include/linux/
autoconf.h does not exist"
```

```
"Please load the appropriate sources to rebuild module".
```

The message above indicates that the required include file, "autoconf.h", cannot be located on this system. This is usually an indication of a patched kernel without the matching Linux kernel (patch) sources being loaded.

```
"/lib/modules/${THIS_KERNEL}/build/include/linux/version.h
does not match"

"the version of this kernel (${THIS_KERNEL})."

"This is an indication that a patch has been loaded but not
the sources to match the running kernel. This driver
requires the sources to all"

"kernel patches to be loaded in order to relink to the
kernel symbols"
```

The message above indicates that the required include file, "version.h", has been located on this system but the version number inside does not match the current (or booting) Linux kernel. This is usually an indication of a patched kernel without the matching Linux kernel (patch) sources being loaded.

```
"There does not appear to be kernel sources which match the
current booting Linux kernel"

"There must be a directory named
\"/lib/modules/${THIS_KERNEL}\" and there must be a"

"valid directory linked to
\"/lib/modules/${THIS_KERNEL}/build\"."

"Please load the appropriate Linux sources to rebuild
module".
```

The message above indicates that the matching source files for the current (or booting) Linux kernel could not be found. The message is descriptive of how the source directory must look.

```
"Replacing ${CPQEVNT} at ${MY_DATE} . . ."

"Custom cpqevnt Driver installed . . ."

"Reloading the Compaq Advanced Server Management Event
module . . ."
```

The message above indicates that a compile and relink of the cpqevnt driver appears to have been successful. This logs the replacement of the shipping driver.

```
"Replacing ${CPQASM} at ${MY_DATE} . . ."

"Custom cpqevnt Driver installed . . ."

"Reloading the Compaq Advanced Server Management Event
module . . ."
```

The message above indicates that a compile and relink of the cpqasm driver appears to have been successful. This logs the replacement of the shipping driver.

	<pre>"WARNING! The cpqasm RPM is not compatible with this kernel."</pre> <pre>"Remove and install again the cpqasm RPM to correct."</pre> <pre>"See /opt/compaq/cpqhealth/cpqhealth_boot.log for details."</pre> <p>The message above indicates that the rebuild of the driver did not succeed. You can try to remove and install the cpqhealth RPM to see if this will correct the problem. You can also view the <code>"/opt/compaq/cpqhealth/cpqhealth_boot.log"</code> for further information.</p>
issue 3	health driver custom build does not work
symptom	The <code>"/opt/compaq/cpqhealth/custom_cpqhealth.sh"</code> script logs messages to the console and to the <code>"/opt/compaq/cpqhealth/cpqhealth_boot.log"</code> file.
cause	Typically, this symptom occurs because the Linux distribution was patched without loading the sources for the patches. You must also execute the custom build script as user name <code>"root"</code> .
workaround	Almost all of the errors are related to the Linux kernel source. Usually, the problem is not having the matching source files for the patches applied to the current Linux (or booting) kernel.
issue 4	no console messages
symptom	No console messages appear on the text screens (Ctrl+Alt+F1, for instance), and the error messages do get logged properly in <code>/var/log/messages</code> . If you run KDE or Gnome, xterms will also not show the console messages originating from the health driver.
cause	The syslogd daemon is configured slightly differently than other distributions; the system messages will not appear on the lower digit terminals (tty1-9).
workaround	<p>If you do not wish to have the message logging on your system, you may configure it differently by modifying <code>/etc/syslog.conf</code> in the following way:</p> <pre># Log all kernel messages to the console. # Logging much else clutters up the screen. kern.* /dev/console # Log anything (except mail) of level info or higher. # Don't log private authentication messages! *.info;mail.none;news.none;authpriv.none /var/log/messages</pre> <p>After sending a "HUP" signal to syslogd process ID, you should now see your kernel messages appearing on all consoles.</p> <pre>kill -1 <pid of syslogd></pre>

issue 5	failure in cpqimlview
symptom 1	<p>When starting cpqimlview, the IML Viewer, you may see the following message:</p> <pre>ERROR: tclX not installed. tclX must be installed to use the IML viewer.</pre>
cause 1	The IML Viewer is a tcl-based application, so it will not compile or run if this package is not present.
workaround 1	Install the tclx RPM package (for example, tclx-8.2.0-32).
symptom 2	<p>When starting cpqimlview, the IML Viewer, you may see the following message:</p> <pre>"Cannot open /dev/cdt. Wellness driver may not be installed."</pre> <p>The IML is not functioning once this error message appears.</p>
cause 2	The problem lies in the fact that the health driver is not inserted on your system. This, for instance, could have happened, when cpqimlview was used while the Health and Wellness Driver package was uninstalled. Another reason could be that your system is not certified for the current version of the health driver.
workaround 2	<p>Try removing the cpqhealth package and reinstalling it.</p> <pre>rpm -e cpqhealth rpm -ivh cpqhealth-<version>.<distribution>.i386.rpm</pre> <p>This workaround will insert the health driver (verify by typing <code>lsmod</code>). If the driver is not working, then your system is most likely not certified for the health driver.</p>
issue 6	superuser only
symptom	<p>You will experience the following problems:</p> <ul style="list-style-type: none"> • Commands like <code>insmod</code>, <code>modprobe</code>, <code>rmmod</code>, or <code>rpm</code> are not available. • The <code>rpm</code> install will fail because of file permissions being denied (see below). <pre>failed to open //var/lib/rpm/packages.rpm error: cannot open //var/lib/rpm/packages.rpm</pre> <ul style="list-style-type: none"> • The command <code>cpqimlview</code> is not known or fails because of file permissions.
cause	Preparing a driver install necessitates access to system administrator rights.
workaround	Be sure to log in as "root" before you attempt the driver install.

additional issues

tape drives on embedded array controller not supported by cpqarray driver

This section details other issues with running SuSE Linux on ProLiant servers and provides information about resolving them.

The Linux cpqarray driver does not support tape drives. Either an additional SCSI controller must be added to control the tape drive, or an additional array controller must be added for the hard drives and the Integrated Smart Array cache chip be removed from the System I/O Board.

ProLiant servers that use the cciss driver can use hot plug tape drives.

F10 access to the compaq system configuration utility is missing

The ability to access the system partition by pressing **F10** at startup is controlled by the Master Boot Record. If you overwrite the MBR with LILO, you will not be able to access the system partition by pressing **F10** on startup. This option is also not available if the partition does not exist. Here are the steps to recover **F10** functionality.

1. Make sure you have a verified backup and have your boot diskettes available. This procedure is not destructive to data, but a backup is recommended when modifying the MBR.
2. Configure LILO to install to /boot instead of the MBR.
3. Edit `/etc/lilo.conf`.
4. Make reference of your /boot partition (boot=/dev/sda1) in `/etc/lilo.conf` instead of the MBR (boot=/dev/sda) by adding the partition number to the device name.

Note: In this step, the /boot partition is referenced by its specific partition number; therefore, there is no need to point to the MBR.

5. Point to your / (root) partition if /boot is not in its own partition.
6. Verify that image=/boot/vmlinuz-2.2.16 points to a valid kernel name and that root=/dev/ida/c0d0p6 points to the actual / or root partition.
7. Save your changes and exit the editor.
8. Run `/sbin/lilo`. This installs the boot record and makes your changes take effect.
9. Ensure the /boot partition is active by running FDISK, and check that the /boot partition is the only partition marked active.
10. Restore F10 functionality by booting with a DOS or Windows diskette and running `fdisk /mbr`. This restores the MBR boot record program code and allows access to the system partition (this applies to non-RBSU servers).
11. Now you should be able to access the system partition by pressing **F10** during POST. In addition, you should be able to boot back to Linux by just booting the server (without pressing any keys). If you are unable to boot to Linux, [see the "LILO is corrupt" section](#).

LILO is corrupt

This section discusses three methods for recovering your system if LILO no longer points to your root and /boot partitions. The recovery process involves using a Linux boot diskette or the Linux installation CD, mounting the root and /boot partitions, correcting the */etc/lilo.conf* and */etc/fstab* files, and running */sbin/lilo*. You may find that */usr/sbin/chroot* helps during this process.

recovering LILO
from within linux

If you are forced to boot Linux from a diskette to repair LILO, follow these steps:

1. Boot Linux from floppy.
2. Edit the */etc/lilo.conf* and */etc/fstab* files.
3. Run */sbin/lilo* to repair the copy of LILO on the */boot* partition.
4. Verify that the */boot* partition is the only active partition and is a primary partition.

recovering LILO
using boot and
root diskettes

1. Boot the server using the Linux Boot Disk created during the installation process.
2. Type *rescue* at the lilo: prompt.
3. Insert the rescue diskette (which was created from the images directory on the Linux Installation CD) when prompted. In one of the directories (probably */dev* or */tmp*), you will find device nodes that point to your hard drive and partitions.
4. Make a mount point.

```
# mkdir /mnt
# mkdir /mnt/drive
```

5. Mount your root partition.

```
# mount /dev/sda6 /mnt/drive
```

6. Mount your */boot* partition.

```
# mount /dev/sda2 /mnt/drive/boot
```

7. Run *chroot* to */mnt/drive*.

```
# /mnt/drive/usr/sbin/chroot /mnt/drive
# cd /
```

8. Print your partitions in *FDISK* to see what numbers you should be using in */etc/lilo.conf* and */etc/fstab* files.
9. Edit your */etc/lilo.conf* and */etc/fstab* and make sure you have the correct partition numbers.
10. Save your files (*/etc/lilo.conf* and */etc/fstab*).
11. Generate a fresh copy of LILO. (Using the verbose mode may be helpful: */sbin/lilo -v*).

```
# /sbin/lilo
```

12. Exit from your chroot shell.

```
# exit
# cd /
```

13. Unmount your boot and root partitions.

```
# cd /
# umount /mnt/drive/boot
# umount /mnt/drive
```

14. Remove any bootable CD or floppy disks and reboot.

Your Linux server should reboot using the hard drive.

recovering LILO
using original
installation
media

1. Boot the server using the same installation media that was originally used to install the system.
2. Use the Linux installation program to load your SCSI device drivers.

Note: Do not proceed beyond the fdisk or disk druid screen. Also, on the type of install screen, be sure to choose **Custom Install**. Any other choice will erase existing partitions.

3. Access the BASH# prompt by pressing **CTRL+ALT+F2** from the GUI or **ALT+F2** from a text based screen. Pressing this key combination will switch you away from the installer screen (usually F1 for text based and F7 for GUI based) to the second virtual console where the BASH# prompt is located during installation.

Note: Be sure to choose only **Custom Install**, as any other choice (Workstation or Server) will erase existing partitions.

Note: Do not proceed beyond the fdisk or disk druid screen.

4. Once you reach the BASH# prompt, make two directories: (1) /mydev and (2)/mymnt.

```
# mkdir /mydev
# mkdir /mymnt
```

5. Check the /dev directory for the device nodes needed for your SCSI controller. If the device nodes are not present in the /dev directory, then create them in the /mydev directory according to the [Device Node Table](#).

Here is an example using entries for the cpqarray driver:

```
# mknod /mydev/c0d0 b 72 0
# mknod /mydev/c0d0p1 b 72 1
# mknod /mydev/c0d0p15 b 72 15
```

Device Node Table		
Regular SCSI	cpqarray	cciss
sda b 8 0	c0d0 b 72 0	c0d0 b 104 0
sda1 b 8 1	c0d0p1 b 72 1	c0d0p1 b 104 1
sda2 b 8 2	c0d0p2 b 72 2	c0d0p2 b 104 2
sda3 b 8 3	c0d0p3 b 72 3	c0d0p3 b 104 3
sda4 b 8 4	c0d0p4 b 72 4	c0d0p4 b 104 4
sda5 b 8 5	c0d0p5 b 72 5	c0d0p5 b 104 5
sda6 b 8 6	c0d0p6 b 72 6	c0d0p6 b 104 6
sda7 b 8 7	c0d0p7 b 72 7	c0d0p7 b 104 7
sda8 b 8 8	c0d0p8 b 72 8	c0d0p8 b 104 8
sda9 b 8 9	c0d0p9 b 72 9	c0d0p9 b 104 9
sda10 b 8 10	c0d0p10 b 72 10	c0d0p10 b 104 10
sda11 b 8 11	c0d0p11 b 72 11	c0d0p11 b 104 11
sda12 b 8 12	c0d0p12 b 72 12	c0d0p12 b 104 12
sda13 b 8 13	c0d0p13 b 72 13	c0d0p13 b 104 13
sda14 b 8 14	c0d0p14 b 72 14	c0d0p14 b 104 14
sda15 b 8 15	c0d0p15 b 72 15	c0d0p15 b 104 15

6. Use `fdisk -l` to get a listing of your partitions.

Here is an example using `fdisk` to list partitions on an array controller:

```
# fdisk -l /mydev/c0d0
```

7. Mount your root partition to `/mymnt`. You will know which partition is your root partition because it will contain `etc/fstab`.

Here is an example mounting a root partition. In this example, partition 6 is our root partition.

```
# mount /mydev/c0d0p6 /mymnt
# ls /mymnt/etc/fstab
```

If “ls” does not list the `fstab` file, then the partition mounted is probably not the root partition. Try another partition until the root partition is found.

If present, “e2label” may be helpful in determining which partition is which. Here is an example of using e2label on partition number 5:

```
# e2label /dev/c0d0p5
```

e2label should then respond with what mount point c0d0p5 uses. It is possible that e2label may not be available. Another possibility is that the partitions may not have been labeled.

8. Once you have your root partition mounted, mount the rest of your partitions according to the contents of etc/fstab.

```
# cat /mymnt/etc/fstab  
  
# mount /mydev/c0d0p7 /mymnt/usr  
  
# mount /mydev/c0d0p1 /mymnt/boot
```

9. Use chroot to make /mymnt your new temporary root partition.

```
# /mymnt/usr/sbin/chroot /mymnt
```

10. Use Su to switch to the root.

```
# su -
```

11. Make necessary repairs to your system. This usually involves repairing /etc/lilo.conf and possibly /etc/fstab. If there is anything kernel related you would need to do in order to bring the system up, then do that now as well.

```
# cat /etc/lilo.conf  
  
# cat /etc/fstab  
  
# /sbin/lilo
```

12. Exit out of the repair mode once all repairs have been made.

13. Exit from su -

```
# exit
```

14. Exit from chroot.

```
# exit
```

15. Unmount all partitions you mounted. Use the mount command to list partitions you have mounted.

```
# mount
```

Use the umount command to unmount partitions.

```
# umount /mymnt/boot
# umount /mymnt/usr
# umount /mymnt
```

16. Reboot the server. It is not necessary to do anything about /mymnt, /mydev or their contents, as these directories and device nodes were created in a RAM disk. As soon as you reboot, the server will discard the contents of the RAM disk.

unable to dual boot server with both Windows NT and linux

If the server is configured as a dual boot system with Linux and Windows NT, running Windows NT Disk Administrator causes the partition numbers to change. To correct this problem, follow these steps:

1. Boot the server using a Linux boot disk or CD.
2. Install a new boot record.
3. Modify the */etc/fstab* file to point to the correct partition numbers.

Refer to www.linuxdoc.org/HOWTO/mini/Linux+NT-Loader.html for further information on dual booting Linux and Windows NT.

moving LILO from the MBR to an active primary partition

If the F10 System Partition is still intact on your system and you have an active primary partition available to install LILO to, it is beneficial to move LILO from the MBR to the active primary partition so that the F10 key is able to start the System Configuration Utility on boot up.

To move LILO, do the following:

1. Obtain or create a Linux boot floppy.
2. Install LILO to the active primary partition.
3. Remove LILO from the MBR.

Installing LILO to the active primary partition requires modifying the */etc/lilo.conf* configuration file. Please refer to the LILO man page for more information.

removing LILO from the MBR

LILO can be removed from the MBR by booting to a DOS/Win95/Win98 boot disk and running the command: `fdisk /mbr`. Before you remove LILO from the MBR you should have a Linux boot disk, in case your system fails to boot from the hard drive. If you are moving LILO from the MBR to an active primary partition, make sure you have installed a copy of LILO onto the primary active partition **before** removing LILO from the MBR.

configuration file examples

Here are the contents from an example `/etc/conf.modules` file for multiple NICs (two Tlans or three NE-2000s) and multiple SCSI controllers:

```
alias scsi_hostadapter ncr53c8xx

alias scsi_hostadapter1 ncr53c8xx

alias eth0 tlan

alias eth1 tlan

alias eth2 ne

alias eth3 ne

alias eth4 ne

options ne io=0x300,0x280,0x240
```

Adding System Partition to LILO (embedded SCSI). Here are contents from an example `/etc/lilo.conf` file:

```
boot=/dev/sda1

map=/boot/map

install=/boot/boot.b

prompt

timeout=50

image=/boot/vmlinuz-2.2.16

label=linux

root=/dev/sda6

initrd=/boot/initrd-2.2.16.img

read-only

other=/dev/sda3

label=scu

table=/dev/sda
```

Adding System Partition to LILO (Compaq Array Controller). Here are the contents from a sample `/etc/lilo.conf`:

```
boot=/dev/ida/c0d0p1
map=/boot/map
install=/boot/boot.b
prompt
timeout=50
image=/boot/vmlinuz-2.2.16
label=linux
root=/dev/ida/c0d0p6
initrd=/boot/initrd-2.2.16.img
read-only
other=/dev/ida/c0d0p3
label=scu
table=/dev/ida/c0d0
```

questions and answers

Q1. Where can I get more information on Compaq and Linux?

A1. The Compaq Linux website hosts an array of information, such as the distributions Compaq supports, white papers, customer advisories, support matrices, and a direct link to all Linux SoftPaqs for servers and storage options. Check here: www.compaq.com/linux/.

Q2. Does Compaq have Open Source projects?

A2. Compaq is hosting a number of ongoing open source software projects running on ProLiant platforms. The Compaq open source website contains engineering projects, technical papers, news and articles from within the Compaq open source community. Compaq also aids in the support of Linux by regularly contributing software to the Linux kernel.

Visit the Compaq Open Source website at www.opensource.compaq.com/.

Q3. Why start by erasing the system?

A3. Starting with a system erase ensures that you begin the installation process from a known non-configured state.

Q4. How do I erase the system?

A4. Boot from the SmartStart CD and choose System Erase from the Main menu.

Q5. How do I get to the main menu of SmartStart if all that shows is a boot instead of the graphical menu when booting to the SmartStart CD?

A5. One method is to build and use the System Erase Diskette. Create this diskette from the Compaq Disk Builder by inserting the SmartStart CD into a system running Microsoft Windows; the Autorun feature automatically starts the Disk Builder Program.

Q6. Why put LILO on the first sector of the /boot partition instead of into the MBR?

A6. If you put LILO into the MBR, you will not be able to access the System Configuration Utilities by pressing **F10** during system boot up. The F10 key functions properly if LILO is placed on the /boot partition and that partition marked active.

Note: If you prefer to put LILO in the master boot record, you can set up LILO so that it can boot the Compaq partition using LILO mechanisms instead of the **F10** key.

Q7. Why put the /boot partition immediately after the Compaq System Partition?

A7. This keeps the /boot partition completely below the 1024 cylinder limit.

Q8. How do you verify that the SCSI controllers have been identified during installation?

A8. Use the LEFT ALT+F3 and LEFT ALT+F4 buttons to change screen views.

If a Smart Array Controller is installed, these screens indicate the controller was found. The Compaq System Partition appears as partition three (ida/c0d0: p3).

```
Compaq Smart2 Driver (v 0.9.9)

Found 1 controller(s)

Finding drives on ida0 (SMART-221)

ida/c0d0: blksize=512 nr_blks=4096320

ida/c0d0: p3
```

If you have an embedded SCSI controller, you should see an indication that it has been found:

```
sym53c8xx: .....
or
ncr53c8xx: .....
```


compaq.com web resources

The following links contain valuable information regarding Linux, ProLiant servers, software downloads, and additional technical documentation.

The sites listed in Table 2 are described or referenced in this document. The sites listed in Table 3 are Web links to API ProLiant and ASE ProLiant certification.

table 2. compaq.com web resources

resource description	web address
ActiveAnswers provides a dynamic set of tools, forums and information to help you plan, deploy and operate enterprise solutions.	www.compaq.com/activeanswers
Linux Support Software provides support software, device drivers, agents, utilities and links to comprehensive support software listings for all supported Linux distributions.	www.compaq.com/products/servers/linux/linux-drivers.html
Linux on ProLiant Servers provides information regarding Compaq and Linux partnerships and solutions.	www.compaq.com/products/servers/linux/
E-Commerce Solution Sizer is automated tool assisting the user with sizing Compaq hardware for E-Commerce and Web Server applications.	http://vcmpoapp02.compaq.com/aasizercode/aasizer.asp?L=no&SizerCountry=UnitedStates&SizerName=E_Catalog
SmartStart Subscription Service is a tool that simplifies server setup, providing a rapid way to deploy reliable and consistent server configurations.	www.compaq.com/products/servers/smartstart/
Training Certification offers a variety of customer education and training on the full range of Compaq products to partners, resellers, major accounts, and end users alike.	www.compaq.com/training/
Customer Advisories notify you of potential issues before you encounter them and provide you with workarounds and solutions to enhance your Compaq products and environment.	www3.compaq.com/support/reference_library/selectproduct.asp
Intelligent Manageability provides tools, guides, and information to reduce expense, minimize complexity, and speed execution.	www.compaq.com/manage/

resource description	web address
Linux at Compaq offers industry-defining technology, break-through performance, high availability, and easy serviceability.	www.compaq.com/products/software/linux/
Linux Options Support Matrix includes the latest Options Support Matrix and discusses products supported by Linux.	www.compaq.com/products/servers/linux/OptionsMatrix.html
Linux Server Certification Matrix contains the latest tested, supported, and certified information about Linux operating systems supported on ProLiant servers.	www.compaq.com/products/servers/linux/certMatrix.html
Opensource@compaq.com hosts a number of Open Source software projects running on various Compaq systems.	http://opensource.compaq.com/
Press Releases are a reference for shareholders and customers. They contain information that was current at the time of the announcement.	www.compaq.com/newsroom/
White Papers and Other Technical Documents (Complete Listing) inform you of ways to optimize your environment and obtain the maximum benefit from software enhancements and hardware upgrades.	www3.compaq.com/support/reference_library/selectproduct.asp

table 3. training and certification web links

resource description	web address
The API ProLiant/Linux site is focused on certifying advanced Linux skills concerning the installation, configuration, and system tuning of the Linux operating system on ProLiant servers.	www.compaq.com/certification/na/api_ProLiant_linux.html
The ASE ProLiant/Linux site is focused on certifying advanced Linux skills concerning the installation, configuration, and system tuning of the Linux operating system on ProLiant servers	www.compaq.com/certification/na/ase_proliant_linux.html

SuSE web resources

The following links contain valuable information regarding SuSE Linux. The sites listed in Table 4 are described or referenced in this document.

table 4. SuSE Linux web links

resource description	web address
SuSE Support Knowledge base is a searchable support database available in many languages.	http://sdb.suse.de/sdb/en/html/
Linux Knowledge Portal for SuSE is here for you to arrange your personal Portal and specifically enhance your knowledge of Linux.	www.linux-knowledge-portal.org/en/index.php
SuSE Download Area contains updates, patches, and ftp links to download SuSE software.	www.suse.de/en/support/download/
Security Announcements keeps you informed with the latest information as it relates to security.	www.suse.de/en/support/security/index.html

helpful linux resources

The websites listed in Table 5 are additional helpful Linux web resources.

table 5. helpful linux web resources

resource description	web address
The Linux Documentation Project: Guides, HOWTOs, FAQs, man pages, and the Linux Gazette.	www.linuxdoc.org/
Linux Online contains information about Linux applications, documentation, hardware, user groups and courses.	www.linux.org/
Linux International is a non-profit association of groups, corporations and others that work towards the promotion of growth of the Linux operating system and the Linux community.	www.li.org/
The GNU project is a repository of free Linux software.	www.gnu.org/
The Free Software Foundation is a mirror web site of the GNU project.	www.fsf.org/
Tux.org contains information about several east coast (U.S.) Linux Users Groups.	www.tux.org/
Tucows.com contains HOWTOs, shareware and other helpful information.	http://linux.tucows.com/

resource description	web address
Rpm2html , if you are looking for rpm, this site that has them all.	http://mirror.ox.ac.uk/rpm2html/
Lxr.linux.no is a Linux kernel code browsing online utility.	http://lxr.linux.no/source/
Xnet contains Tools and utilities for Linux.	http://home.xnet.com/~blatura/linapp6.html
Linux.org.uk contains useful information on Symmetric Multi-Processing using Linux.	www.linux.org.uk/SMP/title.html
The Xfree86 Project . Most Linux distributions (including Caldera, SuSE, and Red Hat) include the free X server developed by this organization.	www.xfree86.org/
Linux Today - Linux News On Internet Time.	http://linuxtoday.com/
Slashdot - A useful site for daily news.	www.slashdot.org/
Freshmeat - A large index of ports of software for Linux and other platforms. If you are looking for a particular utility or program, try looking here first.	www.freshmeat.net/
Linux SMP FAQ (mirrored from www.irisa.fr/prive/dmentre/smp-faq).	www.phy.duke.edu/brahma/smp-faq
Linux.com is your one-stop Linux Web page, from chatting to news to links -- and more!	www.linux.com/
The Linux Kernel Archives contains information on the various Linux kernel release.	www.kernel.org/

feedback

Help us improve our technical communication. Let us know what you think about the technical information in this document. Your feedback is valuable and will help us structure future communications. Please send your comments to: OSIntegrationFeedback@hp.com.

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